

AMENDMENTS TO THE CLAIMS

1. **(Currently Amended)** A reconstituted cell-free translation system for generating a peptidomimetic product comprising:
 - (a) translation factors; and
 - (b) more than one elongator tRNA species which (i) is charged with a non-naturally occurring amino acid or amino acid analog, and (ii) recognizes a trinucleotide sense codon,wherein the cell-free translation system capable of translating translates exogenously added mRNA species with highly selective incorporation at each of said trinucleotide sense codon codons to form the peptidomimetic product, and wherein the peptidomimetic product comprises a said non-naturally occurring amino acid acids or amino acid ~~analog~~ analogs;
~~and wherein one or more of the codons is one of the 61 sense codons or one of the three termination codons.~~
2. **(Currently Amended)** The translation system of claim 1 for generating a peptidomimetic product, which system is substantially free of the translation factors EF-P, W, W2 ~~or~~ and rescue.
3. **(Canceled)**
4. **(Previously Presented)** The translation system of claim 1 for generating a peptidomimetic product, which system is substantially free of a translation factor selected from the group consisting of EF-P, W, W2 and rescue.
5. **(Currently Amended)** The translation system of claim 1, wherein the amino acid analog is selected from the group consisting of ~~β-cyanoalanine~~ β-cyanoalanine, canavanine, djenkolic acid, norleucine, 3-phosphoserine, homoserine, dihydroxyphenylalanine, 5-hydroxytryptophan, 1-methylhistidine, 3-methylhistidine, allyl glycine (or its alkyne

counterpart), O-methyl-serine, biotinyl-lysine, biotinyl-cysteine (or other biotin-labelled amino acids) cyclohexylalanine, homoglutamate, D-alanine (or other D-amino acids), N-methyl glycine (or other N-methyl amino acids) and epsilon-N-methyl-lysine.

6. **(Currently Amended)** The translation system of claim 1, further comprising more than one ~~exogeneously~~ exogenously added mRNA species encoding different peptidomimetic products.
7. **(Currently Amended)** A cell-free translation system comprising translation factors and tRNA species ~~capable of translating that translates~~ exogenously added mRNA species with ~~highly selective incorporation at each codon~~ to form a peptidomimetic product, which system
 - (a) lacks more than one active wild-type elongator amino acyl tRNA species and lacks the ability to synthesize said wild-type amino acyl tRNA species, and
 - (b) ~~includes~~ comprises more than one exogenous elongator amino acyl tRNA species charged with a nonnatural amino acid species or amino acid analog, the exogenous elongator amino acyl tRNA species replacing said wild-type elongator amino acyl tRNA species.
8. **(Currently Amended)** A cell-free translation system comprising translation factors and tRNA species ~~capable of translating that translates~~ exogeneously added mRNAs to form a peptidomimetic product, which system
 - (a) lacks one or more active wild-type amino acyl tRNA species and lacks the ability to synthesize said wild-type amino acyl tRNA species,
 - (b) includes at least one exogenous amino acyl tRNA species charged with a nonnatural amino acid species or amino acid analog, the exogenous amino acyl tRNA species replacing said ~~inactive~~ active wild-type amino acyl tRNA species, and
 - (c) comprises a plurality of different mRNA species encoding a plurality of peptidomimetic products.

9. **(Currently Amended)** A kit for translating exogeneously added mRNA to form a peptidomimetic product, the kit comprising:
- (a) [[,]] translation factors and more than one elongator tRNA species charged with a non-naturally occurring amino acid or amino acid analog capable of translating exogeneously added mRNA species with highly selective incorporation at each codon to form a peptidomimetic product; and
 - (b) instructions associated there with for using the kit for translating exogeneously added mRNA to form a peptidomimetic product.
10. **(Currently Amended)** A kit for translating exogeneously added mRNA to form a peptidomimetic product, the kit comprising:
- (a) a cell-free translation system comprising translation factors and tRNA species capable of translating exogeneously added mRNA species to form a peptidomimetic product, which system
 - (i) lacks more than one active wild-type elongator amino acyl tRNA species and lacks the ability to synthesize said wild-type amino acyl tRNA species,
 - (ii) includes more than one exogenous elongator amino acyl tRNA species charged with a nonnatural amino acid species or amino acid analog, the exogenous elongator amino acid acyl tRNA species replacing said wild-type elongator amino acyl tRNA species; and
 - (b) comprises instructions associated ~~there with~~ therewith for using the kit for translating exogeneously added mRNA to form a peptidomimetic product.
11. **(Previously Presented)** A method for generating a peptidomimetic product comprising:
- (a) contacting the translation system of claim 1 with one or more exogenous mRNA species encoding peptidomimetic products; and
 - (b) allowing sufficient time for the exogenous mRNA species to be translated, thereby generating the peptidomimetic product.

12. **(Canceled)**
13. **(Previously Presented)** The method of claim 11, wherein the method is carried out on a library of at least 100 different mRNA species.
14. **(Previously Presented)** The method of claim 11, wherein the mRNA species are generated by in vitro transcription in the translation system.
15. **(Currently Amended)** The method of claim 11, wherein the peptidomimetic products are formed as a covalent adduct of the ~~exogeneous~~ exogenous mRNA by which said products are encoded.
16. **(Previously Presented)** The method of claim 11, wherein the translation system is contacted with a library of different exogeneous mRNA species to generate a variegated population of peptidomimetics products of at least 10^3 different sequences.
17. **(Original)** The method of claim 16, wherein at least 10^8 different sequences are produced.
18. **(Canceled)**
19. **(Previously Presented)** A method for generating a peptidomimetic comprising:
 (a) contacting the translation system of claim 7 with one or more exogenous mRNA species encoding peptidomimetic products; and
 (b) allowing sufficient time for the exogenous mRNA species to be translated, thereby generating the peptidomimetic product.

20-22. **(Canceled)**

23. **(Previously Presented)** The translation system of claim 1, wherein the translation factors are bacterial translation factors.
24. **(Previously Presented)** The translation system of claim 7, wherein the translation factors are bacterial translation factors.
25. **(Previously Presented)** The translation system of claim 1, comprising four or more tRNA species charged with a non-naturally occurring amino acid or amino acid analog.
26. **(Previously Presented)** The translation system of claim 6, comprising four or more tRNA species charged with a non-naturally occurring amino acid or amino acid analog.
27. **(Previously Presented)** The translation system of claim 1, wherein highly selective incorporation at each codon comprises at least 90% selective incorporation.
28. **(Previously Presented)** The translation system of claim 1, wherein highly selective incorporation at each codon comprises at least 95% selective incorporation.
29. **(Previously Presented)** The translation system of claim 1, wherein highly selective incorporation at each codon comprises at least 98% selective incorporation.
30. **(Previously Presented)** The method of claim 13, wherein the peptidomimetic products are identified or isolated from the translation system based on catalytic or binding activity.
31. **(Previously Presented)** The translation system of claim 7 comprising a plurality of different mRNA species.

32. **(Previously Presented)** The translation system of claim 1, wherein the peptidomimetic product comprises more than two unnatural amino acids or amino acid analogs.
33. **(Previously Presented)** The translation system of claim 31, wherein the peptidomimetic product comprises five unnatural amino acids or amino acid analogs.
34. **(Previously Presented)** The translation system of claim 7, wherein one or more of each codon is one of the 61 sense codons.
35. **(Previously Presented)** The translation system of claim 7, wherein one or more of each codon is one of the three termination codons.
36. **(Previously Presented)** The method of claim 11, comprising contacting the translation system with more than one exogenous mRNA species.
37. **(Previously Presented)** The method of claim 19, comprising contacting the translation system with more than one exogenous mRNA species.
38. **(Previously Presented)** The method of claim 11, wherein the peptidomimetic products are identified, isolated, or both.
39. **(Previously Presented)** The method of claim 19, wherein the peptidomimetic products are identified, isolated, or both.
40. **(Previously Presented)** The translation system of claim 1, wherein the amino acyl tRNA species is synthesized from a tRNA species lacking a terminal CA dinucleotide.
41. **(Previously Presented)** The translation system of claim 1, wherein the amino acyl tRNA species is synthesized from a tRNA species that is synthesized *in vitro*.

42. **(Previously Presented)** The translation system of claim 1, wherein the peptidomimetic product comprises an unnatural backbone.
43. **(Previously Presented)** The translation system of claim 1, further lacking the ability to synthesize at least one wild-type amino acyl tRNA species.
44. **(Previously Presented)** The translation system of claim 1, wherein the non-naturally occurring amino acid or the amino acid analog is synthesized by chemical modification of a natural amino acyl tRNA.
- 45-51. **(Canceled)**
52. **(New)** The method of claim 19, wherein the exogenous mRNA species is generated by *in vitro* transcription in the translation system.
53. **(New)** The cell-free translation system of claim 7, wherein the translation system translates exogenously added mRNA species with highly selective incorporation at each codon to form a peptidomimetic product.
54. **(New)** The kit of claim 9, wherein the kit translates exogenously added mRNA species with highly selective incorporation at each codon to form a peptidomimetic product.
55. **(New)** The kit of claim 10, wherein the cell-free translation system translates exogenously added mRNA species to form a peptidomimetic product.